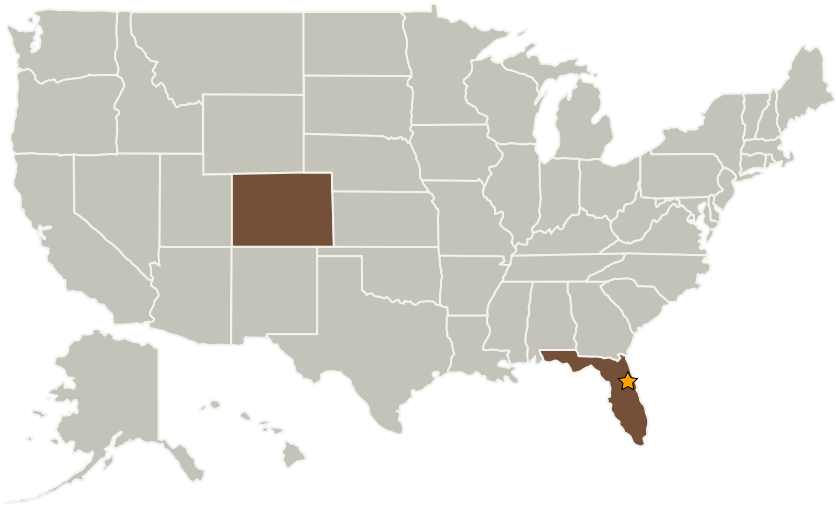
Mars Integrated Propellant Production System, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

The Integrated Mars In-Situ Propellant Production System (IMISPPS) is an end-to-end system that will produce rocket propellant on Mars from CO2 in the Martian atmosphere. The IMISPPS combines the RWGS and Sabatier reactions in a single reactor to produce a useful high-specific impulse fuel (methane plus carbon monoxide) and water, which is condensed and electrolyzed to produce oxygen and hydrogen. The hydrogen is recycled back to the Sabatier/RWGS reactor to react with Martian CO2 to produce more fuel, while the oxygen is cryogenically stored to provide oxidizer. Some of the carbon monoxide is removed by cryogenic separation to increase propellant specific impulse. Carbon dioxide acquisition to feed the fuel reactor is accomplished using a lightweight freezer. Use of the IMISPPS has the advantage of producing all the oxygen needed to burn the methane with only in a single catalytic reactor required. In the proposed work, we will build a brassboard core of the IMSIPPS and demonstrate its performance and reliability.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Pioneer Astronautics	Supporting Organization	Industry Historically Underutilized Business Zones (HUBZones)	Lakewood, Colorado

Primary U.S. Work Locations	
Colorado	Florida

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Anthony C Muscatello

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables